

# UK Patent Application GB 2 374 581 A

(43) Date of A Publication 23.10.2002

(21) Application No 0109690.8

(22) Date of Filing 20.04.2001

(71) Applicant(s)

Reckitt Benckiser (UK) Limited  
(Incorporated in the United Kingdom)  
103-105 Bath Road, SLOUGH, Berkshire, SL1 3UH,  
United Kingdom

(72) Inventor(s)

Paul John Duffield

(74) Agent and/or Address for Service

Elizabeth A Dickson  
Reckitt Benckiser plc, Group Patents Departments,  
Danson Lane, HULL, HU8 7DS, United Kingdom

(51) INT-CL<sup>7</sup>  
B65D 65/46

(52) UK CL (Edition T )  
B8C CWA3-CWS8

(56) Documents Cited

GB 2358382 A  
GB 2356842 A  
US 5224601 A

\*GB 2357488 A  
WO 1993/008095 A1

(58) Field of Search

UK CL (Edition S ) B8C CWA3 CWS8  
INT-CL<sup>7</sup> B65D 65/46  
ONLINE: WPI, JAPIO, EPODOC

(54) Abstract Title

Water-soluble containers

(57) A water soluble container is formed by generating a water soluble form with at least two compartments, each compartment is filled with a different composition 1,2. The container is formed by forming a first compartment, then by adding the lid which has the second compartment integral to it. For preference the compartments contain fabric care, surface care, dishwashing, water-softening, disinfectant, antibacterial or antiseptic compositions. The water soluble material of the container is preferably polyvinyl alcohol, hydroxymethylpropyl cellulose or gelatin.

FIG. 1.

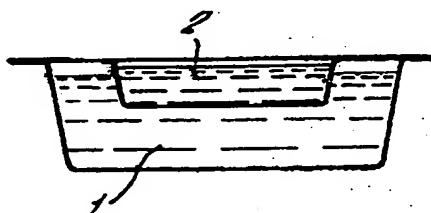
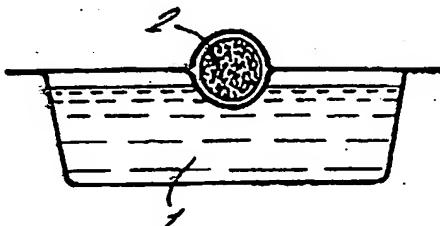


FIG. 2.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

BEST AVAILABLE COPY

GB 2 374 581 A

114

FIG. 1.

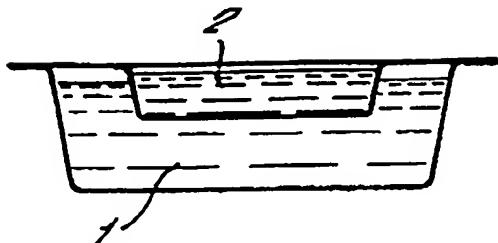


FIG. 2.

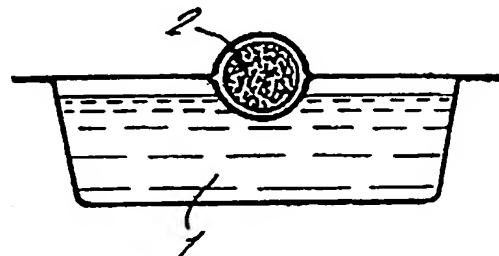


FIG. 3.

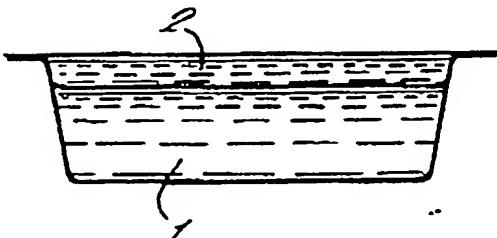
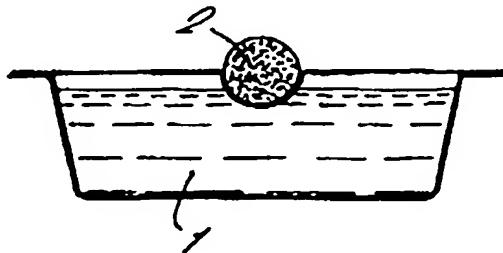


FIG. 4.



IMPROVEMENTS IN OR RELATING TO COMPOSITIONS

The present invention relates to a water-soluble container  
5 and to a process for preparing such a container.

It is known to package chemical compositions, particularly those which may be of a hazardous or irritant nature, in films, particularly water soluble films. Such containers  
10 can simply be added to water in order to dissolve or disperse the contents of the container into the water.

For example, WO 89/12587 discloses a package which comprises an envelope of a water soluble material which comprises a  
15 flexible wall and a water-soluble heat seal. The package may contain an organic liquid comprising, for example, a pesticide, fungicide, insecticide or herbicide.

WO 92/17382 discloses a package containing an agrochemical comprising a first sheet of non-planar water-soluble or water-dispersible material and a second sheet of water-soluble or water-dispersible material superposed on the first sheet and sealed to it.

25 Such arrangements have, however, a number of difficulties. In particular, the packages cannot easily contain two or more compositions, because they only have one compartment. Thus they cannot contain two compositions which are incompatible with each other, or a composition which is  
30 incompatible with one of the films or sheets used to package the composition unless special precautions are taken.

The present invention provides a water-soluble article comprising a first compartment, for example in the form of a pocket, said compartment being sealed with a sealing member,  
5 for example in the form of a film, wherein said sealing member comprises a second composition, for example held within a second compartment.

The present invention also provides a process for producing  
10 a container as defined above which comprises:  
a. producing a first compartment;  
b. filling the first compartment with the first composition; and  
c. sealing the first compartment with the sealing member.  
15

The term "water soluble" is taken to include water dispersible.

The containers of the present invention can have a particularly attractive appearance since they contain two compositions held in a fixed position in relation to each other. The compositions can be easily differentiated to accentuate their difference. For example, the compositions can have a different physical appearance, or can be coloured differently. Thus, for example, the containers can have an appearance of a fried egg or eyeball.

The container may contain two components which are incompatible with each other. It may also contain a component which is incompatible with the part of the container enclosing the other component. For example, the

second composition may be incompatible with the part of the container enclosing the first composition.

If it is desired that the container releases the components,  
5 it is possible to ensure that the components are released at different times. Thus, for instance, one composition can be released immediately the container is added to water, whereas the other may be released later. This may be achieved by having a compartment which takes longer to  
10 dissolve surrounding one of the compositions, which may be either the first or the second composition. This may be achieved, for example, by having different compartment thicknesses. Alternatively, the second composition may simply be held on the outside of the sealing member, in  
15 which case it can start to dissolve as soon as the article is added to water. It may also be achieved by choosing compartments which dissolve at different temperatures, for example the different temperatures encountered during the cycle of a laundry or dish washing machine.

20 The first compartment may be formed of, for example, a moulded composition, especially one produced by injection moulding or blow moulding. The walls of the compartment may, for example, have a thickness of greater than 100 µm, 25 for example greater than 150 µm or greater than 200 µm, 300 µm, 500 µm, 750 µm or 1mm. Preferably the walls have a thickness of from 200 to 400µm.

The first compartment may also, for example, be formed of a film. The film may be a single film, or a laminated film as  
30 disclosed in GB-A-2,244,258. While a single film may have

pinholes, the two or more layers in a laminate are unlikely to have pinholes which coincide.

The film may be produced by any process, for example by  
5 extrusion and blowing or by casting. The film may be unoriented, monoaxially oriented or biaxially oriented. If the layers in the film are oriented, they usually have the same orientation, although their planes of orientation may be different if desired.

10

The layers in a laminate may be the same or different. Thus they may each comprise the same polymer or a different polymer.

- 15 Examples of water-soluble polymers which may be used in a single layer film or in one or more layers of a laminate or which may be used for injection moulding or blow moulding are poly(vinyl alcohol) (PVOH), cellulose derivatives such as hydroxypropyl methyl cellulose (HPMC) and gelatin. An  
20 example of a preferred PVOH is ethoxylated PVOH. The PVOH may be partially or fully alcoholised or hydrolysed. For example it may be from 40 to 100%, preferably from 70 to 92%, more preferably about 88% or about 92%, alcoholised or hydrolysed. The degree of hydrolysis is known to influence  
25 the temperature at which the PVOH starts to dissolve in water. 88% hydrolysis corresponds to a film soluble in cold (ie room temperature) water, whereas 92% hydrolysis corresponds to a film soluble in warm water.
- 30 The thickness of the film used to produce the first compartment, which may be in the form of a pocket, is

preferably 40 to 300  $\mu\text{m}$ , more preferably 80 to 200  $\mu\text{m}$ , especially 100 to 160  $\mu\text{m}$ , more especially 100 to 150  $\mu\text{m}$  and most especially 120 to 150  $\mu\text{m}$ .

- 5 The pocket may be formed by, for example, vacuum forming or thermoforming. For example, in a thermoforming process the film may be drawn down or blown down into a mould. Thus, for example, the film is heated to the thermoforming temperature using a thermoforming heater plate assembly, and
- 10 then drawn down under vacuum or blown down under pressure into the mould. Plug-assisted thermoforming and pre-stretching the film, for example by blowing the film away from the mould before thermoforming, may, if desired, be used. One skilled in the art can choose an appropriate
- 15 temperature, pressure or vacuum and dwell time to achieve an appropriate pocket. The amount of vacuum or pressure and the thermoforming temperature used depend on the thickness and porosity of the film and on the polymer or mixture of polymers being used. Thermoforming of PVOH films is known
- 20 and described in, for example, WO 00/55045.

A suitable forming temperature for PVOH or ethoxylated PVOH is, for example, from 90 to 130°C, especially 90 to 120°C. A suitable forming pressure is, for example, 69 to 138kPa (10 to 20 p.s.i.), especially 83 to 117 kPa (12 to 17 p.s.i.). A suitable forming vacuum is 0 to 4 kPa (0 to 40 mbar), especially 0 to 2 kPa (0 to 20 mbar). A suitable dwell time is, for example, 0.4 to 2.5 seconds, especially 2 to 2.5 seconds.

While desirably conditions chosen within the above ranges, it is possible to use one or more of these parameters outside the above ranges, although it may be necessary to compensate by changing the values of the other two  
5 parameters.

The first compartment is then filled with the desired first composition. The first compartment may be completely filled or only partially filled. The composition may be a solid.

10 For example, it may be a particulate or granulated solid, or a tablet. It may also be a liquid, which may be thickened or gelled if desired. The liquid composition may be non-aqueous or aqueous, for example comprising less than or more than 5% total or free water. The composition may have more  
15 than one phase. For example it may comprise an aqueous composition and a liquid composition which is immiscible with the aqueous composition. It may also comprise a liquid composition and a separate solid composition, for example in the form of a ball, pill or speckles.

20 The composition may be any composition which is intended to be released in an aqueous environment. Thus, for example, it may be an agrochemical composition such as a plant protection agent, for instance a pesticide such as an  
25 insecticide, fungicide, herbicide, acaricide, or nematocide, a plant growth regulator or a plant nutrient. Such compositions are generally packaged in amounts of from 0.1 g to 7 kg, preferably 1 to 5 kg, when in solid form. When in liquid or gelled form, such compositions are generally  
30 packaged in amounts of from 1 ml to 10 litres, preferably 0.1 to 6 litres, especially from 0.5 to 1.5 litres.

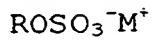
The first composition may also be a fabric care, surface care or dishwashing composition. Thus, for example, it may be a dishwashing, water-softening, laundry or detergent composition, or a rinse aid. Such compositions may be suitable for use in a domestic washing machine. The composition may also be a disinfectant, antibacterial or antiseptic composition, or a refill composition for a trigger-type spray. Such compositions are generally packaged in amounts of from 5 to 100 g, especially from 15 to 40 g. For example, a dishwashing composition may weigh from 15 to 30 g, a water-softening composition may weigh from 15 to 40 g.

15 The composition, if in liquid form, may be anhydrous or comprise water, for example at least 5 wt %, preferably at least 10 wt %, water based on the weight of the aqueous composition. Desirably the composition contains less than 80 wt % water.

20 The remaining ingredients of the first composition depend on the use of the composition. Thus, for example, the composition may contain surface active agents such as an anionic, nonionic, cationic, amphoteric or zwitterionic 25 surface active agents or mixtures thereof.

Examples of anionic surfactants are straight-chained or branched alkyl sulfates and alkyl polyalkoxylated sulfates, also known as alkyl ether sulfates. Such surfactants may be 30 produced by the sulfation of higher C<sub>6</sub>-C<sub>20</sub> fatty alcohols.

Examples of primary alkyl sulfate surfactants are those of formula:



wherein R is a linear C<sub>8</sub>-C<sub>20</sub> hydrocarbyl group and M is a water-solubilising cation. Preferably R is C<sub>10</sub>-C<sub>16</sub> alkyl, for example C<sub>12</sub>-C<sub>14</sub>, and M is alkali metal such as lithium, sodium or potassium.

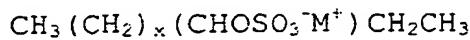
Examples of secondary alkyl sulfate surfactants are those which have the sulfate moiety on a "backbone" of the molecule, for example those of formula:



wherein m and n are independently 2 or more, the sum of m+n typically being 6 to 20, for example 9 to 15, and M is a water-solubilising cation such as lithium, sodium or potassium.

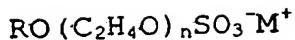
Especially preferred secondary alkyl sulfates are the (2,3) alkyl sulfate surfactants of formulae:

20



25 for the 2-sulfate and 3-sulfate, respectively. In these formulae x is at least 4, for example 6 to 20, preferably 10 to 16. M is cation, such as an alkali metal, for example lithium, sodium or potassium.

30 Examples of alkoxylated alkyl sulfates are ethoxylated alkyl sulfates of the formula:



wherein R is a C<sub>8</sub>-C<sub>20</sub> alkyl group, preferably C<sub>10</sub>-C<sub>18</sub> such as a  
 5 C<sub>12</sub>-C<sub>16</sub>, n is at least 1, for example from 1 to 20, preferably  
 1 to 15, especially 1 to 6, and M is a salt-forming cation  
 such as lithium, sodium, potassium, ammonium, alkylammonium  
 or alkanolammonium. These compounds can provide especially  
 desirable fabric cleaning performance benefits when used in  
 10 combination with alkyl sulfates.

The alkyl sulfates and alkyl ether sulfates will generally  
 be used in the form of mixtures comprising varying alkyl  
 chain lengths and, if present, varying degrees of  
 15 alkoxylation.

Other anionic surfactants which may be employed are salts of  
 fatty acids, for example C<sub>8</sub>-C<sub>18</sub> fatty acids, especially the  
 sodium or potassium salts, and alkyl, for example C<sub>8</sub>-C<sub>18</sub>,  
 20 benzene sulfonates.

Examples of nonionic surfactants are fatty acid alkoxylates,  
 such as fatty acid ethoxylates, especially those of formula:



wherein R is a straight or branched C<sub>8</sub>-C<sub>16</sub> alkyl group,  
 preferably a C<sub>9</sub>-C<sub>15</sub>, for example C<sub>10</sub>-C<sub>14</sub>, alkyl group and n is  
 at least 1, for example from 1 to 16, preferably 2 to 12,  
 30 more preferably 3 to 10.

The alkoxylated fatty alcohol nonionic surfactant will frequently have a hydrophilic-lipophilic balance (HLB) which ranges from 3 to 17, more preferably from 6 to 15, most preferably from 10 to 15.

5

Examples of fatty alcohol ethoxylates are those made from alcohols of 12 to 15 carbon atoms and which contain about 7 moles of ethylene oxide. Such materials are commercially marketed under the trademarks Neodol 25-7 and Neodol 23-6.5

- 10 by Shell Chemical Company. Other useful Neodols include Neodol 1-5, an ethoxylated fatty alcohol averaging 11 carbon atoms in its alkyl chain with about 5 moles of ethylene oxide; Neodol 23-9, an ethoxylated primary C<sub>12</sub>-C<sub>13</sub> alcohol having about 9 moles of ethylene oxide; and Neodol 91-10, an  
15 ethoxylated C<sub>9</sub>-C<sub>11</sub> primary alcohol having about 10 moles of ethylene oxide.

Alcohol ethoxylates of this type have also been marketed by Shell Chemical Company under the Dabanol trademark. Dabanol

- 20 91-5 is an ethoxylated C<sub>9</sub>-C<sub>11</sub> fatty alcohol with an average of 5 moles ethylene oxide and Dabanol 25-7 is an ethoxylated C<sub>12</sub>-C<sub>15</sub> fatty alcohol with an average of 7 moles of ethylene oxide per mole of fatty alcohol.

- 25 Other examples of suitable ethoxylated alcohol nonionic surfactants include Tergitol 15-S-7 and Tergitol 15-S-9, both of which are linear secondary alcohol ethoxylates available from Union Carbide Corporation. Tergitol 15-S-7 is a mixed ethoxylated product of a C<sub>11</sub>-C<sub>15</sub> linear secondary  
30 alkanol with 7 moles of ethylene oxide and Tergitol 15-S-9 is the same but with 9 moles of ethylene oxide.

Other suitable alcohol ethoxylated nonionic surfactants are Neodol 45-11, which is a similar ethylene oxide condensation products of a fatty alcohol having 14-15 carbon atoms and 5 the number of ethylene oxide groups per mole being about 11. Such products are also available from Shell Chemical Company.

Further nonionic surfactants are, for example, C<sub>10</sub>-C<sub>18</sub> alkyl polyglycosides, such as C<sub>12</sub>-C<sub>16</sub> alkyl polyglycosides, especially the polyglucosides. These are especially useful when high foaming compositions are desired. Further surfactants are polyhydroxy fatty acid amides, such as C<sub>10</sub>-C<sub>18</sub> N-(3-methoxypropyl) glyciamides and ethylene oxide-propylene 15 oxide block polymers of the Pluronic type.

Examples of cationic surfactants are those of the quaternary ammonium type.

20 The total content of surfactants in the composition is desirably 60 to 95 wt%, especially 75 to 90 wt%. Desirably an anionic surfactant is present in an amount of 50 to 75 wt%, the nonionic surfactant is present in an amount of 5 to 20 wt%, and/or the cationic surfactant is present in an 25 amount of from 0 to 20 wt%. The amounts are based on the total solids content of the composition, i.e. excluding any solvent which may be present.

The composition, particularly when used as laundry washing 30 or dishwashing composition, may also comprise enzymes, such as protease, lipase, amylase, cellulase and peroxidase

enzymes. Such enzymes are commercially available and sold, for example, under the registered trade marks Esperesc, Alcalasc and Savinasc by Nova Industries A/S and Maxatasc by International Biosynthetics, Inc. Desirably the enzymes 5 are present in the composition in an amount of from 0.5 to 3 wt%, especially 1 to 2 wt%.

The composition may, if desired, comprise a thickening agent or gelling agent. Suitable thickeners are polyacrylate 10 polymers such as those sold under the trade mark CARBOPOL, or the trade mark ACUSOL by Rohm and Hass Company. Other suitable thickeners are xanthan gums. The thickener, if present, is generally present in an amount of from 0.2 to 4 wt%, especially 0.5 to 2 wt%.

15 Dishwasher compositions usually comprise a detergency builder. Suitable builders are alkali metal or ammonium phosphates, polyphosphates, phosphonates, polyphosphonates, carbonates, bicarbonates, borates, polyhydroxysulfonates, 20 polyacetates, carboxylates such as citrates, and polycarboxylates. The builder is desirably present in an amount of up to 90 wt%, preferably 15 to 90 wt%, more preferable 15 to 75 wt%, relative to the total weight of the composition. Further details of suitable components are 25 given in, for example, EP-A-694,059, EP-A-518,720 and WO 99/06522.

The compositions can also optionally comprise one or more additional ingredients. These include conventional 30 detergent composition components such as further surfactants, bleaches, bleach enhancing agents, builders,

suds boosters or suds suppressors, anti-tarnish and anti-corrosion agents, organic solvents, co-solvents, phase stabilisers, emulsifying agents, preservatives, soil suspending agents, soil release agents, germicides, pH adjusting agents or buffers, non-builder alkalinity sources, chelating agents, clays such as smectite clays, enzyme stabilizers, anti-limescale agents, colourants, dyes, hydrotropes, dye transfer inhibiting agents, brighteners, and perfumes. If used, such optional ingredients will generally constitute no more than 10 wt%, for example from 1 to 6 wt%, the total weight of the compositions.

The builders counteract the effects of calcium, or other ion, water hardness encountered during laundering or bleaching use of the compositions herein. Examples of such materials are citrate, succinate, malonate, carboxymethyl succinate, carboxylate, polycarboxylate and polyacetyl carboxylate salts, for example with alkali metal or alkaline earth metal cations, or the corresponding free acids. Specific examples are sodium, potassium and lithium salts of oxydisuccinic acid, mellitic acid, benzene polycarboxylic acids, C<sub>10</sub>-C<sub>22</sub> fatty acids and citric acid. Other examples are organic phosphonate type sequestering agents such as those sold by Monsanto under the trade mark Dequest and alkylhydroxy phosphonates. Citrate salts and C<sub>12</sub>-C<sub>18</sub> fatty acid soaps are preferred.

Other suitable builders are polymers and copolymers known to have builder properties. For example, such materials include appropriate polyacrylic acid, polymaleic acid, and

polyacrylic/polymaleic and copolymers and their salts, such as those sold by BASF under the trade mark Sokalan.

The builders generally constitute from 0 to 3 wt%, more 5 preferably from 0.1 to 1 wt%, by weight of the compositions.

Compositions which comprise an enzyme may optionally contain materials which maintain the stability of the enzyme. Such enzyme stabilizers include, for example, polyols such as 10 propylene glycol, boric acid and borax. Combinations of these enzyme stabilizers may also be employed. If utilized, the enzyme stabilizers generally constitute from 0.1 to 1 wt% of the compositions.

15 The compositions may optionally comprise materials which serve as phase stabilizers and/or co-solvents. Example are C<sub>1</sub>-C<sub>3</sub> alcohols such as methanol, ethanol and propanol. C<sub>1</sub>-C<sub>3</sub> alkanolamines such as mono-, di- and triethanolamines can also be used, by themselves or in combination with the 20 alcohols. The phase stabilizers and/or co-solvents can, for example, constitute 0 to 1 wt%, preferably 0.1 to 0.5 wt%, of the composition.

The compositions may optionally comprise components which 25 adjust or maintain the pH of the compositions at optimum levels. The pH may be from, for example, 1 to 13, such as 8 to 11 depending on the nature of the composition. For example a dishwashing composition desirably has a pH of 8 to 11, a laundry composition desirable has a pH of 7 to 9, and 30 a water-softening composition desirably has a pH of 7 to 9. Examples of pH adjusting agents are NaOH and citric acid.

The first composition and the second composition may be the same or different. If they are different, they may, nevertheless, have one or more individual components in common.

After the first compartment has been filled, a sealing member is placed on top of the first compartment and sealed thereto.

10

The sealing member may be produced by, for example, injection moulding or blow moulding. It may also be in the form of a film.

15 In a first embodiment of the invention the sealing member comprises a second composition at the time it is placed on top of the first compartment. This may be held or otherwise adhered on the sealing member. For example it can be in the form of a solid composition such as a ball or pill held on 20 the sealing member by an adhesive or mechanical means. This is especially appropriate when the sealing member has a degree of rigidity, such as when it has been produced by injection moulding. It is also possible for a previously prepared container containing the second composition to be 25 adhered to the sealing member. For example, a sealing member in the form of a film may have a filled compartment containing a composition attached thereto. The second composition or compartment may be held on either side of the sealing member such that it is inside or outside the first 30 compartment.

Generally, however, the second composition is held within a second compartment in the sealing member. This is especially appropriate when the sealing member is flexible, for example in the form of a film.

5

The sealing member is placed on top of the first compartment and sealed thereto. For example the sealing member in the form of a film may be placed over a filled pocket and across the sealing portion, if present, and the films sealed

10 together at the sealing portion. In general there is only one second compartment or composition in or on the sealing member, but it is possible to have more than one second compartment or composition if desired, for example 2 or 3 second compartments or compositions.

15

The second compartment may be formed by any technique. For example it can be formed by vertical form fill sealing the second composition within a film, such as by the process described in WO 89/12587. It can also be formed by having  
20 an appropriate shape for an injection moulding.

However, it is preferred to use a vacuum forming or thermoforming techniques, such as that previously described in relation to the first compartment of the container of the  
25 present invention. Thus, for example, a pocket surrounded by a sealing portion is formed in a film, the pocket is filled with the second composition, a film is placed on top of the filled pocket and across the sealing portion and the films are sealed together at the sealing portion. In  
30 general, however, the film placed on top of the filled

pocket to form the second compartment does not itself comprise a further compartment.

Further details of this thermoforming process are generally 5 the same as those given above in relation to the first compartment of the container of the present invention. All of the above details are incorporated by reference to the second compartment, with the following differences:

10. The second compartment is generally smaller than the first compartment since the film containing the second composition is used to form a lid on the pocket. In general the first compartment and the second compartment (or composition if not held within a compartment) have a volume ratio of from 15 2:1 to 20:1, preferable 4:1 to 10:1. Generally the second compartment does not extend across the sealing portion.

The thickness of the film comprising the second compartment may also be less than the thickness of the film making up 20 the first compartment of the container of the present invention, because the film is not subjected to as much localised stretching in the thermoforming step. It is also desirable to have a thickness which is less than that of the film used to form the first compartment to ensure a 25 sufficient heat transfer through the film to soften the base web if heat sealing is used.

The thickness of the covering film is generally from 20 to 30 160  $\mu\text{m}$ , preferably from 40 to 100  $\mu\text{m}$ , such as 40 to 80  $\mu\text{m}$  or 50 to 60  $\mu\text{m}$ .

This film may be a single-layered film but is desirably laminated to reduce the possibility of pinholes allowing leakage through the film. The film may be the same or different as the film forming the first compartment. If two 5 or more films are used to form the film comprising the second compartment, the films may be the same or different. Examples of suitable films are those given for the film forming the first compartment.

- 10 The first compartment and the sealing member may be sealed together by any suitable means, for example by means of an adhesive or by heat sealing. Mechanical means is particularly appropriate if both have been prepared by injection moulding. Other methods of sealing include infra-red, radio frequency, ultrasonic, laser, solvent, vibration and spin welding. An adhesive such as an aqueous solution of PVOH may also be used. The seal desirably is water-soluble if the containers are water-soluble.
- 15
- 20 If heat sealing is used, a suitable sealing temperature is, for example, 120 to 195°C, for example 140 to 150°C. A suitable sealing pressure is, for example, from 250 to 600 kPa. Examples of sealing pressures are 276 to 552 kPa (40 to 80 p.s.i.), especially 345 to 483 kPa (50 to 70 p.s.i.) or 400 to 800 kPa (4 to 8 bar), especially 500 to 700 kPa (5 to 7 bar) depending on the heat sealing machine used. Suitable sealing dwell times are 0.4 to 2.5 seconds.
- 25

30 One skilled in the art can use an appropriate temperature, pressure and dwell time to achieve a seal of the desired integrity. While desirably conditions are chosen within the

above ranges, it is possible to use one or more of these parameters outside the above ranges, although it would might be necessary to compensate by changing the values of the other two parameters.

5

- In a second embodiment of the invention, the sealing member does not comprise the second composition at the time it is placed on top of the first component. Instead the second composition is added afterwards. Thus, for example, it may 10 be adhered to the sealing member by means of an adhesive. It may also be adhered by mechanical means, particularly when the sealing member has a degree of rigidity, for example when it has been produced by injection moulding. Another possibility is for the sealing member to contain an 15 indentation which is filled, either before or after sealing, by a liquid composition which is allowed to gel in-situ.

20

- If more than one container is formed at the same time from the same sheet, the containers may then be separated from each other, for example by cutting the sealing portions, or flanges. Alternatively, they may be left conjoined and, for example, perforations provided between the individual containers so that they can be easily separated a later stage, for example by a consumer. If the containers are 25 separated, the flanges may be left in place. However, desirably the flanges are partially removed in order to provide an even more attractive appearance. Generally the flanges remaining should be as small as possible for aesthetic purposes while bearing in mind that some flange is 30 required to ensure the two films remain adhered to each other. A flange having a width of 1 mm to 8 mm is

desirable, preferably 2 mm to 7 mm, most preferably about 5 mm.

The containers may themselves be packaged in outer  
5 containers if desired, for example non-water soluble  
containers which are removed before the water-soluble  
containers are used.

The containers produced by the process of the present  
10 invention, especially when used for a fabric care, surface  
care or dishwashing composition, may have a maximum  
dimension of 5 cm, excluding any flanges. For example, a  
container may have a length of 1 to 5 cm, especially 3.5 to  
4.5 cm, a width of 1.5 to 3.5 cm, especially 2 to 3 cm, and  
15 a height of 1 to 2 cm, especially 1.25 to 1.75 cm.

The primary composition and the secondary composition may be  
appropriately chosen depending on the desired use of the  
article.

20 If the article is for use in laundry washing, the first  
composition may comprise, for example, a detergent, and the  
second composition may comprise a bleach, stain remover,  
water-softener, enzyme or fabric conditioner. The article  
25 may be adapted to release the compositions at different  
times during the laundry wash. For example, a bleach or  
fabric conditioner is generally released at the end of a  
wash, and a water-softener is generally released at the  
start of a wash. An enzyme may be released at the start or  
30 the end of a wash.

If the article is for use as a fabric conditioner, the first composition may comprise a fabric conditioner and the second composition may comprise an enzyme which is released before or after the fabric conditioner in a rinse cycle.

5

- If the article is for use in dish washing the first composition may comprise a detergent and the second composition may comprise a water-softener, salt, enzyme, rinse aid, bleach or bleach activator. The article may be 10 adapted to release the compositions at different times during the laundry wash. For example, a rinse aid, bleach or bleach activator is generally released at the end of a wash, and a water-softener, salt or enzyme is generally released at the start of a wash.

15

- The containers of the present invention will now be further described with reference to figures 1 to 4. These illustrate examples of containers which can be produced 20 Each figure shows an article containing a first compartment 1 and a second composition 2. In figures 1 to 3, the second composition is held in a second compartment in a sealing member in the form of a film. In figure 4 the second composition is simply held in a recess in the sealing 25 member.

CLAIMS

1. A water-soluble article comprising a first compartment containing a first composition, said compartment being sealed with a sealing member, wherein said sealing member comprises a second composition.  
5
2. An article according to claim 1 wherein the second composition is held in a second compartment within said sealing member.  
10
3. An article according to claim 1 or 2 wherein the first compartment and the sealing member comprise a poly(vinyl alcohol).  
15
4. An article according to any one of the preceding claims wherein the first compartment has been formed by thermoforming.
- 20 5. An article according to any one of claims 1 to 3 wherein the first compartment has been formed by injection moulding.
- 25 6. An article according to any one of the preceding claims wherein the first composition is a particulate solid, a gel or a liquid.
- 30 7. An article according to any one of the preceding claims wherein the sealing member has been formed by injection moulding.

8. An article according to any one of claims 1 to 6 wherein the sealing member is a film.
9. An article according to claim 8 wherein the film  
5 contains a second compartment which has been formed by a vertical form fill sealing method.
10. An article according to claim 8 wherein the film  
contains a second compartment which has been formed by  
10 thermoforming.
11. An article according to any one of the preceding claims  
wherein the second composition is a particulate solid, a  
gel, a liquid or a compressed solid.
- 15 12. An article according to any one of the preceding claims  
wherein the first composition and the second composition are  
each a fabric care, surface care or dishwashing composition.
- 20 13. An article according to claim 12 wherein each  
composition is a dishwashing, water-softening, laundry or  
detergent composition or a rinse aid.
14. An article according to claim 12 wherein each  
25 composition is a disinfectant, antibacterial or antiseptic  
composition or a refill composition for a trigger-type  
spray.
15. An article according to any one of claims 1 to 11  
30 wherein the first composition and the second composition are  
each an agricultural composition.

16. A process for producing a container as defined in any one of the preceding claims which comprises:
  - a. producing a first compartment;
  - 5 b. filling the first compartment with the first composition; and
  - c. sealing the first compartment with the sealing member.
- 10 17. A process according to claim 16 wherein the sealing member comprises the second composition before it seals the first compartment.
- 15 18. A process according to claim 16 wherein the second composition is applied to the sealing member after the first compartment has been sealed by the sealing member.
19. A process according to claim 17 which comprises:
  - a. producing a pocket surrounded by a sealing portion in a film;
  - b. filling the pocket with the first composition;
  - c. placing a film comprising the second compartment containing a second composition on top of the filled pocket and across the sealing portion; and
  - 25 d. sealing the films together at the sealing portion to form the first compartment.



Application No: GB 0109690.8  
Claims searched: 1-19

Examiner: Jason Scott  
Date of search: 17 October 2001

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.S): B8C (CWA3, CWS8)

Int Cl (Ed.7): B65D (65/46)

Other: ONLINE: WPI, JAPIO, EPODOC

**Documents considered to be relevant:**

Category	Identity of document and relevant passage		Relevant to claims
X, E	GB 2358382 A	RECKITT BECKISER See whole document and in particular page 20, lines 4-17.	1-7 & 11-18
X, E	GB 2357488 A	AQUASOL See whole document and in particular page 23, line 30 to page 24, line 2.	1-7, 11 & 16-18
X, E	GB 2356842 A	AQUASOL See whole document and in particular page 2, lines 15-28.	1-7, 11 & 16-18
X	WO 93/08095 A1	RHONE-POULENC See whole document and in particular page 3, line 22 to page 4, line 14.	1-8, 11, 15, 16, 18 & 19
X	US 5224601	GOUGE See whole document and in particular column 1, line 60 to column 2, line 21.	1-8, 11, 14, 16, 18 & 19

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

A Document indicating technological background and/or state of the art  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.

**Page Blank (uspto)**

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

**BLACK BORDERS**

**IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**

**FADED TEXT OR DRAWING**

**BLURRED OR ILLEGIBLE TEXT OR DRAWING**

**SKEWED/SLANTED IMAGES**

**COLOR OR BLACK AND WHITE PHOTOGRAPHS**

**GRAY SCALE DOCUMENTS**

**LINES OR MARKS ON ORIGINAL DOCUMENT**

**REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**

**OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**

This Page Blank (uspto)